



Ferndale Refinery

3901 Unick Road – P.O. Box 8
Ferndale, Washington 98248
phone 360.384.1011

February 27, 2006



Ms. Donna Darm
Chief, Protected Resources Division
1201 NE Lloyd Blvd., Suite 1100
Portland, OR 97232-1274

Re: Comments of ConocoPhillips on Proposed Recovery Plan for the Southern Resident Killer Whale

Dear Ms. Darm:

ConocoPhillips appreciates the opportunity to provide these comments on the National Marine Fisheries Service's ("NOAA Fisheries") Proposed Recovery Plan for the Southern Resident Killer Whales (*Orcinus orca*) prepared pursuant to the Endangered Species Act ("ESA").

ConocoPhillips owns and operates the Ferndale Refinery, a crude oil processing plant located on the shores of Puget Sound 20 miles south of the United States/Canadian border. The company is committed to sustainable operation and development and to responsible environmental stewardship. We have made significant efforts to prevent oil spills from occurring. Unlike whale watching boats, the presence of tanker vessels and any associated noise are not threats to killer whales or killer whale habitat. Our outfall does not contain the types of contaminants that NOAA Fisheries has identified as a significant threat to killer whales. We believe that the combination of these efforts ensures that Southern Resident Killer Whales are not adversely affected by our operations in Washington State.

ConocoPhillips respectfully submits that to be effective the final Recovery Plan must acknowledge and reflect the fact that oil and gas activities in Puget Sound are not a cause of Southern Resident Killer Whale decline and are highly regulated to protect both killer whales and their habitat. Specifically, the final Recovery Plan should incorporate past agency findings that the existing, comprehensive web of state, federal, international, and voluntary oil spill prevention and response measures is sufficiently protective of killer whales. The final Recovery Plan should also make it clear that commercial shipping traffic does not impede killer whale passage and that the low-frequency sounds emitted by large vessels are well below the sensitive portion of the killer whales' hearing range. Finally, the final Recovery Plan should clearly distinguish between organochlorine

compounds and emerging contaminants, which NOAA Fisheries believes are a significant threat to killer whales and their prey, and polycyclic or polyaromatic hydrocarbons (“PAHs”), which have not been shown to adversely affect killer whales or their primary prey. In addition, the final Recovery Plan should avoid overbroad statements regarding PAHs by consistently emphasizing that any possible concern related to PAHs is limited to emissions from whale watching vessels. Doing so will not only avoid confusion in the future, it will ensure that agency and other recovery resources are properly allocated to address real, as opposed to unsupported, threats to Southern Resident Killer Whales and will prevent the imposition of unnecessary regulations without any tangible benefit to the species.

DETAILED COMMENTS

As a preliminary matter, ConocoPhillips joins in the comments submitted by the Western States Petroleum Association (“WSPA”).¹ In particular, ConocoPhillips concurs in WSPA’s recommendation that NOAA Fisheries delay issuance of the final recovery plan in order to convene and gather the input of a recovery team comprised of recognized experts from the public and private sectors. As WSPA makes clear, a collaborative recovery planning process will allow the agency to prepare a plan that complies with Section 4(f) of the ESA, which requires recovery plans to describe site-specific management actions; provide objective, measurable recovery criteria; and estimate the time and cost of carrying out recovery measures.² Moreover, as WSPA points out and as discussed further below, the Proposed Recovery Plan is riddled with vague statements and overgeneralizations that do not accurately reflect the current state of knowledge, thereby creating uncertainty for the regulated community and compromising the effectiveness of the Proposed Recovery Plan. Once again, increasing public participation in the recovery planning process will help ameliorate the current defects in the Proposed Recovery Plan.

I. Oil Spill Prevention and Response Planning

NOAA Fisheries states that the Proposed Recovery Plan attempts “to reconcile” the “disparate views” of those who maintain that existing federal, state, and international regulations and programs are adequate to address the threat of oil spills and those who believe additional prevention and response actions should be taken.³ To that end, NOAA Fisheries indicates that the Proposed Recovery Plan discusses existing safety measures,

¹ See Letter Re: “Comments of Western States Petroleum Association on Why the National Marine Fisheries Service Should Postpone Issuance of the Draft Recovery Plan for Southern Resident Killer Whales and Conduct a More Open, Collaborative Recovery Planning Process,” from Frank E. Holmes (WSPA) to Chief, Protected Resources Division (NOAA Fisheries) dated February 27, 2007 (“WSPA Draft Recovery Plan Comment Letter”).

² *Id.*; 16 U.S.C. § 1533(f).

³ See National Marine Fisheries Service Northwest Region, “Proposed Recovery Plan for the Southern Resident Killer Whales (*Orcinus orca*)” (Nov. 2006) at 3 (“Proposed Recovery Plan”).

as requested by industry groups, and also includes language suggested by conservation groups regarding potential improvements that can be made.⁴

While no doubt well-intentioned, NOAA Fisheries' consensus-oriented approach undermines the value of the Proposed Recovery Plan as a planning tool. As written, the Proposed Recovery Plan fails to meaningfully describe the breadth and effectiveness of the environmental laws, regulatory programs, and policies currently in place to address oil spill risks and does not analyze the probability of an oil spill in Puget Sound. As a consequence, the resulting recovery program places a high priority on developing new oil spill prevention policies when, in fact, NOAA Fisheries has elsewhere determined that the probability of an oil spill is low and that existing spill regulations are adequate to protect Southern Resident Killer Whales.⁵ To avoid misallocation of limited agency and other resources, and to ensure that the final Recovery Plan is consistent with the agency's record, the Proposed Recovery Plan should be revised to clearly reflect the best available information on the effectiveness of current regulatory mechanisms and the risk of oil spills in Puget Sound.

First, the final Recovery Plan should acknowledge that NOAA Fisheries has previously and repeatedly concluded that existing oil spill regulations are adequate to prevent both jeopardy and adverse modification of killer whale critical habitat. When listing Southern Resident Killer Whales, NOAA Fisheries found the likelihood of an oil spill to be "low" and, significantly, did not single out oil spill prevention and response measures as an area of inadequate regulation.⁶ Similarly, when designating critical habitat for Southern Resident Killer Whales, NOAA Fisheries explicitly stated, in both the proposed rule and supporting documents, that "additional oil spill regulations are not needed to meet ESA Section 7 consultation requirements."⁷ In other words, the agency has determined that no additional measures are necessary to minimize the possibility of an oil spill or to minimize adverse effects to killer whales or their habitat in the very unlikely event that a spill does occur. To preempt future confusion regarding the adequacy of current oil spill preparedness and to avoid the possibility of unnecessary regulation, the final Recovery Plan should reference NOAA Fisheries' conclusions regarding the adequacy of existing oil spill prevention and response measures.

Second, the final Recovery Plan should discuss the full range of overlapping regulatory schemes already in place to address the risk of an oil spill and avoid impacts to marine

⁴ *Id.* at 3, 141.

⁵ See, e.g., Proposed Recovery Plan at 74-75, Table 6 (summarizing agency findings on listing factors); 70 Fed. Reg. 69,903, 69,908 (November 18, 2005) (final rule listing Southern Resident Killer Whales); 71 Fed. Reg. 34,571, 34,579 (June 15, 2006); National Marine Fisheries Service Northwest Region, "Designation of Critical Habitat for Southern Resident Killer Whales: Section 4(b)(2) Report," at 15 (Table 2), 16 (October 2006) ("4(b)(2) Report").

⁶ Proposed Recovery Plan at 74-75, Table 6; 70 Fed. Reg. at 69,908.

⁷ See 71 Fed. Reg. at 34,579; 4(b)(2) Report at 15 (Table 2), 16; see also Industrial Economics, Inc., "Economic Impacts Associated with Potential Critical Habitat Designation for the Southern Resident Population of Killer Whales," 3-7 to 3-9 (Final Report) (November 7, 2006) (discussing oil spill prevention and response regulations and planning) ("Economic Report").

resources. As written, the Proposed Recovery Plan contains only a brief description of a small subset of the existing international, federal, and state oil spill prevention and response programs without providing detailed information about what these programs entail.⁸ In addition, the Proposed Recovery Plan does not describe the numerous industry-initiated safety practices followed by the marine shipping industry in Puget Sound.

At a minimum, the final Recovery Plan should contain a thorough description of the requirements imposed pursuant to the following programs:

- International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties
- International Convention for the Prevention of Pollution from Ships
- International Convention on Oil Pollution Preparedness, Response and Cooperation
- International Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances
- Federal Oil Pollution Act
- Spill Prevention, Control and Countermeasure Plans
- Facility Response Plans
- Federal Prevention and Enforcement Programs
- Coast Guard Port State Control
- Joint United States/Canada Response Team
- National Preparedness for Response Exercise Program
- Northwest Area Committee and Work Groups
- Memorandum of Agreement on Strengthening the State/Coast Guard Partnership
- State Approval of Vessels and Oil Handling Facilities

Each of these programs is described in a comment letter submitted by WSPA to NOAA Fisheries on proposed recovery planning for the Southern Resident Killer Whales, a copy of which is attached hereto as Exhibit A.⁹

In addition to these regulatory programs, the final Recovery Plan should describe the actions that ConocoPhillips and other industry representatives have taken, in cooperation with state and federal agencies, to ensure that oil spill prevention and response planning reflects the most protective measures possible. For example, working with the Olympic Coast National Marine Sanctuary, the petroleum industry has helped establish an "Area to be Avoided" to move vessel traffic entering and leaving the Strait of Juan de Fuca away from sensitive areas. Through the Puget Sound Harbor Safety Committee, industry representatives have helped develop the Puget Sound Harbor Safety Plan and Standards

⁸ See Proposed Recovery Plan at 112-14, 141-42.

⁹ Letter Re: "Proposed Recovery Planning Process for Southern Resident Killer Whales," from Frank Holmes (WSPA) and Michael Moore (Pacific Merchant Shipping Association) to Donna Darm (NOAA Fisheries) dated July 3, 2006 ("WSPA Recovery Planning Comment Letter"). ConocoPhillips incorporates WSPA's Recovery Planning Comment Letter by reference and requests that NOAA Fisheries include it in its administrative record for the Recovery Plan.

of Care, which focus on reducing the risk of a spill. ConocoPhillips and other industry representatives in the United States and Canada instituted the International Tug of Opportunity System to track and identify tugs for vessel support within Puget Sound. In addition, we and others have supported placement of an equitably funded dedicated tug at the entrance of the Strait. As part of the Northwest Area Committee, industry has helped develop the Puget Sound Area Contingency Plan and have been instrumental in testing the protection strategies for sensitive areas throughout Puget Sound. Finally, ConocoPhillips, like others in the industry, continues to work closely with the Coast Guard and Outer Coast Logistics Project to develop a database to identify logistical and communications needs. These are just some of the voluntary efforts being made by Washington State's petroleum industry to ensure that oil spill related risks in Puget Sound are effectively minimized and which should be acknowledged in the final Recovery Plan.

A full accounting of existing regulatory and voluntary programs is particularly important given that the Proposed Recovery Plan identifies a number of recovery actions purportedly aimed at reducing oil spills risks as "high priority needs" – such as (1) continued conversion to vessels with safer designs, (2) improved salvage and rescue capabilities, (3) continued operating standards at oil handling facilities and aboard vessels, (4) prevention of pipeline spills near marine areas, (5) prevention of waste oil dumping from vessels, and (5) greater enforcement.¹⁰ Not only does the Proposed Recovery Plan fail to provide any specifics, let alone the site-specific description required by Section 4(f), regarding these management actions, NOAA Fisheries has failed to demonstrate that such measures are actually warranted. The Proposed Recovery Plan does not identify any inadequacies in the current regulatory scheme or provide any other basis for characterizing these management measures as a high priority. As a result, new measures developed in response to the Recovery Plan run the risk of being duplicative and unnecessarily burdensome.

To avoid this possibility, NOAA Fisheries should firmly place its discussion of additional oil spill policies in the context of existing programs in order to ensure that areas of potential improvement, if any, are accurately identified and that research is targeted in a way that uses agency and other recovery resources wisely. In addition, the final Recovery Plan should indicate that the adequacy of any new measures should be reviewed by the Washington State Department of Ecology ("Ecology") and the U.S. Coast Guard, rather than the Oil Spill Advisory Committee ("OSAC"), since Ecology and the U.S. Coast Guard are the regulatory bodies charged with implementation of oil spill regulations, whereas OSAC, as its name suggests, is simply an advisory committee.

Third, the final Recovery Plan should recognize the success of existing regulatory measures. Not only should the final Recovery Plan include NOAA Fisheries' previous conclusions regarding the adequacy of existing oil spill prevention and response measures, as discussed above, the final Recovery Plan should provide more concrete and

¹⁰ Proposed Recovery Plan at 141.

up-to-date information regarding the probability of an oil spill in Puget Sound.¹¹ The myriad state, regional, federal and international regulatory and non-regulatory programs have successfully reduced the occurrence and probability of oil spill events in Puget Sound and ensure protection of killer whales and their habitat. Puget Sound currently possesses the lowest commercial vessel oil spill rate in the nation for cargo vessels transiting in and out of our waters. From the 1970s through the 1990s, there was a 94-percent reduction in average annual oil spill volumes from all vessel types. There have been no documented drift grounding oil spill incidents in Puget Sound in over several million monitored vessel transits since the Vessel Traffic Service was implemented in the 1970s.¹² The Proposed Recovery Plan admits that the number and size of oil spills “appear” to have declined,¹³ but fails to provide any statistical information to define the severity of the risk of an oil spill.

Fourth, and finally, given the significant overlapping regulatory and non-regulatory oil spill prevention and response programs in place, the reduced risk of an oil spill in Puget Sound, and the fact that NOAA Fisheries has indicated that imposition of additional oil spill measures on oil and gas transport and production are not necessary to satisfy section 7,¹⁴ the final Recovery Plan should clearly indicate that development and implementation of new oil spill regulations is a low priority. The available information on oil spill preparedness indicates that agency and other resources are best spent on other, more pressing, aspects of the recovery program.

II. Vessel Traffic and Noise

As discussed in Section I, above, tanker vessel movements are highly regulated by numerous state programs, federal laws, and international treaties. To ensure that additional conditions are not unnecessarily placed on oil tanker traffic, NOAA Fisheries’ final Recovery Plan should clearly distinguish between the effects of vessel presence and sound from large vessels, like oil tankers, and those attributable to recreational boaters and whale watchers when describing vessel-related threats to Southern Resident Killer Whale habitat.

The Proposed Recovery Plan recognizes that certain vessels can present obstacles to free passage by killer whales, causing them to swim further and change direction more often thereby potentially increasing their energy output and altering their foraging behavior.¹⁵ In the past, NOAA Fisheries has used the broad characterization “vessel traffic” in describing these types of adverse effects, when, in fact, the balance of all of NOAA Fisheries’ Southern Resident Killer Whale documents – including the agency’s listing decision, Proposed Conservation Plan, Proposed Critical Habitat Rule, and documents supporting the Final Critical Habitat Rule– clearly identify recreational boaters and whale

¹¹ See also WSPA Draft Recovery Plan Comment Letter at 10-12 (discussing inadequacies of Proposed Recovery Plan’s discussion of current oil spill risks and reliance on out-dated information).

¹² WSPA Recovery Planning Comment Letter at 3 (citing U.S. Coast Guard Oil Spill Compendium, 2001).

¹³ Proposed Recovery Plan at 113.

¹⁴ See *id.* at 74-75, Table 6; 70 Fed. Reg. at, 69,908.

¹⁵ Proposed Recovery Plan at 100-01.

watching vessels as the sole vessel-traffic threat to killer whales or their habitat.¹⁶ In the Proposed Recovery Plan, however, NOAA Fisheries has made a concerted effort to distinguish the effects of recreational boaters and whale watching vessels from those associated with commercial shipping traffic and other large vessels.¹⁷ ConocoPhillips appreciates NOAA Fisheries' attention to this issue and urges the agency to go one step further by reiterating findings on vessel impacts that it has made elsewhere, which explicitly recognize that large vessels such as military and Coast Guard ships and ferries do not impede killer whale movement.¹⁸ Like these large ships, oil tankers do not affect Southern Resident Killer Whale habitat and the final Recovery Plan should make that fact clear.

With regard to the potential effects of vessel noise, the Proposed Recovery Plan, like many of NOAA Fisheries' other killer whale documents, remains misleading. The Proposed Recovery Plan repeatedly states that the threshold levels at which underwater sound harms killer whales is poorly understood.¹⁹ This statement – which is used broadly in the Proposed Recovery Plan, as well as the agency's ESA final listing determination, Proposed Conservation Plan, and critical habitat designations to apply to all vessel noise – derives from the 2002 Southern Resident Killer Whale status report, which makes this statement in the context of discussing *whale watching vessels*, not large commercial vessels or tankers.²⁰

In fact, unlike recreational boating and whale watching, large commercial vessels are associated with low frequency sound in the 0.005 to 0.5 kHz range.²¹ NOAA Fisheries states in its Proposed Recovery Plan, and elsewhere, that the lower range of the killer whale's hearing ability is 1 kHz and the most sensitive portion of its hearing range is from 18 to 42 kHz.²² Thus, while there may be some uncertainty regarding the effect of higher frequency vessels like recreational boaters and whale watchers, NOAA Fisheries *does know* that the lower frequencies emitted by large vessels are outside of the killer whale's most sensitive range. Accordingly, the final Recovery Plan should be careful not to link statements regarding the uncertain effect of noise from whale watching vessels to

¹⁶ See, e.g., 70 Fed. Reg. at 69,908 (citing concerns over compliance with whale watching guidelines, potential Marine Mammal Protection Act violations, and increased numbers of vessels engaged in whale watching as one reason for listing Southern Resident Killer Whale as "endangered"); National Marine Fisheries Services, "Proposed Conservation Plan for Southern Resident Killer Whales (*Orcinus orca*)," at 83- 89 (dated Aug. 2005; released Oct. 3, 2005) (dedicating 6 pages to the adverse effects of whale watching traffic and one paragraph to acoustic – but not traffic-related – effects of "other vessels") ("Proposed Conservation Plan"); 71 Fed. Reg. at 34,580 (identifying message to boaters and whale watchers to operate vessels responsibly as primary value of designating critical habitat in Area 1); 4(b)(2) Report at 18-19 (stating that education of whale watchers is "crucial" to successful killer whale conservation efforts).

¹⁷ Proposed Recovery Plan at 100-108 (discussing whale watchers and other vessels separately).

¹⁸ 71 Fed. Reg. at 34,578; Economic Report at 1-5.

¹⁹ See, e.g., Proposed Recovery Plan at 101, 109.

²⁰ *Id.* at 101 (citing Krahn, et al. 2002, "Status review of southern resident killer whales (*Orcinus orca*) under the Endangered Species Act").

²¹ *Id.* at 108.

²² *Id.* at 19; see also 71 Fed. Reg. at 34,572.

large vessels like oil tankers, and should clarify that there is no evidence that sound at frequencies of 0.5 kHz or less is harmful to killer whales. In addition, the final Recovery Plan should focus research and monitoring efforts on whale-watching vessels and other smaller recreational boaters whose impacts are an identified threat to Southern Resident Killer Whales, rather than commercial shipping vessels, whose impacts are known not to be a threat.

III. Polyaromatic Hydrocarbons

ConocoPhillips objects to statements in the Proposed Recovery Plan that PAHs are a concern for Southern Resident Killer Whales and their habitat. Moreover, even if PAHs could be considered a contaminant of concern for killer whales, ConocoPhillips objects to any implication that PAHs attributable to commercial shipping traffic, and specifically tanker traffic, pose a threat to the species. As discussed below, such statements are unsupported and potentially misleading. The Proposed Recovery Plan should therefore clearly distinguish between organochlorine compounds and emerging contaminants, which NOAA Fisheries believes are a significant threat to killer whales and their primary prey,²³ and insignificant levels of PAHs, which have not been shown to adversely affect either Southern Resident Killer Whales or their prey. In addition, whenever discussing PAHs, the final Recovery Plan should make it clear that the agency's concerns are limited to PAHs emitted by whale watching vessels.

The Proposed Recovery Plan does not establish that PAHs present a threat to Southern Resident Killer Whales or their habitat. Instead, the Proposed Recovery Plan, like the Proposed Conservation Plan on which it is based, simply relies on generalized statements about PAHs (namely, that PAHs are one of several chemicals that can be toxic in high levels, and that PAHs are present in Puget Sound)²⁴ to suggest that PAHs are “problematic.”²⁵ However, NOAA Fisheries has *not* identified PAHs as a concern supporting its decision to list killer whales and has admitted elsewhere that there are “no studies linking PAHs to the decline” of Southern Resident Killer Whales.²⁶

In fact, trophic level increases of PAHs through biomagnification have not been observed in aquatic ecosystems because PAHs are commonly metabolized.²⁷ Consequently, PAHs are not available to top predators such as killer whales.²⁸ In any case, fish species with the highest potential to be contaminated are bottom fish, which contribute very little to the Southern Resident Killer Whale diet.²⁹ These conclusions are supported by research conducted by the British Columbia Department of Fisheries and Oceans on contaminant levels in Southern Resident Killer Whales, which found extremely high levels of PCBs

²³ Proposed Recovery Plan, at 73, 87-98; *see also* 70 Fed. Reg. at 69,908; 71 Fed. Reg. at 34,573; Proposed Conservation Plan at 72-82.

²⁴ Proposed Conservation Plan at 72, 81; Proposed Recovery Plan at 87, 97.

²⁵ *See, e.g.*, Proposed Recovery Plan at 87, 97.

²⁶ 70 Fed. Reg. 69,903; 71 Fed. Reg. at 69,059.

²⁷ *See* Exhibit B hereto at 2 (citing McElroy et al. 1989; Broman et al. 1990).

²⁸ *Id.* at 2.

²⁹ *Id.* at 4.

and DDTs and lower levels of dioxins and furans, but did not report finding PAHs.³⁰ The Proposed Recovery Plan's designation of PAHs as a potential concern to killer whales or their habitat is thus erroneous and should be corrected in the final Recovery Plan.

Even if PAHs could be considered a contaminant of concern for killer whales, it is clear from the Proposed Recovery Plan that NOAA Fisheries believes the risks associated with PAHs are limited to impacts attributable to the whale watching industry. The only proposed conservation measure related to PAHs is to test ambient air quality *near whale watching vessels* to determine whether killer whales are inhaling harmful levels of PAHs emitted by boats in regular close proximity.³¹ At no point has NOAA Fisheries demonstrated that any supposed concern regarding PAHs can be linked to commercial shipping traffic.

In sum, NOAA Fisheries should ensure that the discussion of PAHs in the final Recovery Plan cannot be taken out of context to justify otherwise unnecessary restrictions. To that end, the final Recovery Plan should avoid using overly broad terms like "contaminants" and "pollutants" when intending to refer to specific organochlorines, emerging contaminants, and other contaminants known to be harmful to killer whales.³² In addition, NOAA Fisheries should qualify its generalized discussion of PAHs³³ by indicating that potential concern regarding PAH is limited to the whale watching industry emissions and not other vessel traffic.

IV. Conclusion

Thank you for the opportunity to provide these comments and to assist NOAA Fisheries in developing a final Recovery Plan for Southern Resident Killer Whales. If you have any questions regarding these comments, please contact me at (360) 384-8407.

Sincerely,



Gary A. Solari, P.E.
Health, Safety, and Environmental Manager

cc: Frank Holmes, Northwest Manager, Western States Petroleum Association
Cherise Oram, Stoel Rives LLP

³⁰ *Id.* at 3 (citing Schmidt and Johnson 2001).

³¹ Proposed Recovery Plan at 139.

³² *See, e.g., id.* at vi, 136-38. Given NOAA Fisheries' indication that the final Recovery Plan could result in changes to water quality standards and discharge permit requirements established pursuant to the Clean Water Act, *see, e.g., id.* at 137, such sweeping terminology could be used to impose unnecessarily restrictions on those whose effluent contains "contaminants" and "pollutants" but does not contain the specific types of contaminants – in particular PCBs and DDTs – that NOAA Fisheries has identified as a potential threat to killer whales and their habitat.

³³ *See, e.g., id.* at 87, 97.

EXHIBIT A



Western States Petroleum Association



July 3, 2006

Ms. Donna Darm, Assistant Regional Administrator
National Marine Fisheries Service
Northwest Region
7600 Sand Point Way
Seattle, WA 98101
Email: orcahabitat.nwr@noaa.gov

Re: Proposed Recovery Planning Process for Southern Resident Killer Whales

Dear Ms. Darm:

The Pacific Merchant Shipping Association ("PMSA") and Western States Petroleum Association ("WSPA") (collectively, "the Associations") appreciate the opportunity to provide the National Marine Fisheries Service ("NMFS") with the following comments and information to assist NMFS in its development of a proposed recovery plan for Southern Resident killer whales (*Orcinus orca*). The Associations likewise submit these comments for NMFS' consideration in response to the Agency's proposed rule to designate critical habitat for the species. See 71 Fed. Reg. 34572 (June 15, 2006). The Associations represent commercial marine transport companies, container and oil terminals (and pipelines) in Puget Sound, Washington, and on the West Coast of the United States. Member companies operate marine vessels that transport a range of container cargo, crude oil, petroleum products, and other economically important materials to and from ports on the West Coast. Continued safe, secure, efficient, and environmentally-responsible operation of member vessels and facilities are issues of regional and national importance.

On October 3, 2005, NMFS published a notice requesting comments on a proposed conservation plan for Southern Resident killer whales prepared by NMFS under the Marine Mammal Protection Act ("MMPA") ("the Conservation Plan" or "the Plan"). See 70 Fed. Reg. 57565 (October 3, 2005). On November 18, 2005, NMFS listed the Southern Resident population unit as endangered under the Endangered Species Act ("ESA"). See 70 Fed. Reg. 69903 (November 18, 2005). Recent communications with the Agency indicate that NMFS intends to issue a proposed recovery plan for the species under Section 4(f) the ESA in the very near future based upon the Conservation Plan previously developed by the Agency under the MMPA. The Associations have reviewed the Conservation Plan prepared by NMFS under the MMPA, and offer the following comments to assist the Agency in its development of a draft ESA recovery plan for this species.

First, the Associations' support killer whale conservation and recognize that much scientific uncertainty exists regarding the factors relating to the health of killer whales in this region. We recognize that these scientific uncertainties create a significant challenge for NMFS. In view of the uncertainties associated with this species, we encourage NMFS to engage in as open a public process as possible to develop a scientifically-sound and fully informed recovery plan. The Associations intend to participate in these processes where and when appropriate to facilitate agency understanding of complex industry operations, regulations and performance to help insure agency actions are based upon the best available scientific and commercial information.

Second, the Conservation Plan and listing documents contain a reasonably thorough analysis of killer whale life history and other relevant background information. However, the Associations believe the Conservation Plan also omits key information and analysis. In particular, the Plan makes broad generalizations about potential risks to the species without a complete analysis of these risks. For example, the Plan portrays the risk of oil spills in Puget Sound as a significant risk to the species; however, the Plan does not adequately define or analyze the probability of Orca-threatening oil spill events in Puget Sound, nor does it consider the myriad of shipping and environmental laws, regulations, policies, and programs that have been successfully implemented and are continuously updated to address such risks. As a result, we believe the Plan does not accurately assess the risk of oil spill events, inviting the agency and other parties to invest limited resources in areas that are comprehensively and successfully addressed. We are committed to risk based, cost-effective risk mitigation and continuous improvement. This commitment requires a comprehensive understanding of the risk mitigation regimes in place now and how they are performing. We therefore recommend that NMFS revise the Plan as outlined below to incorporate a detailed analysis of existing regulatory mechanisms that address species' needs, and that NMFS avoid making sweeping (and unsupported) statements about risk without such an analysis.

The Conservation Plan also fails to adequately consider a number of key factors that may have caused the decline of the species, or that may interfere with species recovery. Regarding ambient noise and vessel traffic, the Plan appropriately avoids calling for regulatory restraints on non-whale watching vessels (e.g., marine container ships and oil tankers) given the absence of evidence linking such vessel traffic to whale impacts. However, with regard to food supply, the Plan makes no attempt to estimate the prey needed by a healthy killer whale population, and the proposed conservation measures would not significantly increase the availability of the killer whales' major prey, Chinook salmon, for several decades (Appendix A). A disconnect also exists between the Plan's identification of organochlorines (mainly PCBs and DDT) and other bioaccumulative toxins as a potential threat to the killer whales, and the Plan's generalized call for minimizing the discharge of all pollutants. Since specific types of contaminants are the focus of concern, the recommendations also should focus on those specific contaminants. The Plan should call for focused actions on these and other factors of decline, similar to the specific measures proposed for reducing whale watching impacts.

Aside from the Associations' concerns with the Plans' lack of detailed analysis, the Associations are also concerned with the process used by NMFS to develop the Conservation Plan. Given the cultural, legal, and economic significance of this listing, and the complexity

surrounding species recovery, the Associations recommend that NMFS establish a recovery team whose purpose would be to advise the Agency on recovery plan development. See 16 U.S.C. § 1533(f) (providing for formulation of recovery team). Such a process would result in the development of a more thorough and balanced recovery plan. The Associations recommend that NMFS delay issuing a proposed recovery plan until such time that a qualified recovery team is convened, and the team is provided an opportunity to review in detail and comment upon recommendations contained in NMFS' Conservation Plan.

I. Regulatory Measures and Processes that Prevent and Address Oil Spill Risks

A host of overlapping, sophisticated, and in some cases, redundant, regulatory programs exist that have dramatically reduced the occurrence and probability of oil spill events in Puget Sound. Such programs include spill international, federal, and state response planning, prevention, coordination, and enforcement actions. International and federal programs have undergone continuous refinement and revision in response to continuous evaluation of safety standards. These measures, coupled with industry-initiated measures identified below, have resulted in dramatic decreases in oil spill events from vessels nationwide. For example, from 1970's through the 1990's, there was a 94% reduction in average annual oil spill volumes from all vessel types (U.S Coast Guard Oil Spill Compendium - 2001).¹ From a regional perspective, Puget Sound has been a leader possessing the lowest commercial vessel oil spill rate in the nation for cargo vessels transiting in and out of our waters. There have been no documented drift grounding oil spill incidents in Puget Sound in over several million monitored vessel transits since the Vessel Traffic Service was implemented in the 1970's. This safety record is a result of many factors including years of regulatory and technological improvements, such as the required use of double hulled vessels, voluntary double hulling of fuel tanks on cargo ships, enhanced vessel traffic separation schemes and services, improvements in communications and global positioning systems, and implementation of a variety of oil spill prevention and compliance programs such as those discussed below.

Below we summarize relevant international, federal and state programs that have combined with non-regulatory efforts to effectively reduce oil spill-related risks in Puget Sound. This list is not exhaustive; rather, it is intended to illustrate the range of programs that currently exists to prevent and address oil spills in Puget Sound. Appendix B provides a partial listing and description of additional measures warranting NMFS' consideration. The Associations recommend that NMFS review in detail the full range of these and other applicable regulatory and non-regulatory programs prior to developing a recovery plan or other killer whale conservation recommendations.

A. International Maritime Organization

Due to the international nature of the shipping industry, it has long been recognized that actions to improve safety in maritime operations are more effective if carried out at an international level whenever possible rather than by individual countries acting unilaterally and without coordination. Although a number of important international agreements had already been

¹ See <http://www.uscg.mil/hq/g-m/nmc/response/stats/aa.htm>.

adopted, many countries believed that there was a need for a permanent body which would be able to coordinate and promote further measures on a more regular basis. It was against that background that a conference held by the United Nations in 1948 adopted a convention establishing the International Maritime Organization (IMO) as the first ever international body devoted exclusively to maritime matters (the original name was the Inter-Governmental Maritime Consultative Organization, or IMCO, but the name was changed in 1982 to IMO).

The International Maritime Organization is a permanent international body established under a 1958 International Convention to promote international maritime safety.² The IMO presently consists of 166 member states, including the U.S. Since its inception, the IMO has enacted a series of conventions and measures designed to prevent maritime accidents and to minimize their consequences. In order to achieve its objectives, IMO has, in the last 30 years, promoted the adoption of some 30 conventions and protocols and adopted well over 700 codes and recommendations concerning maritime safety, the prevention of pollution and related matters. These conventions and measures include the following:

International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties - This Convention, enacted in 1968, affirms the right of a coastal state to take such measures on the high seas as may be necessary to prevent, mitigate or eliminate danger to its coastline or related interests from pollution by oil or the threat thereof, following upon a maritime casualty. Amendments to the Convention later extended it to cover substances other than oil.

International Convention for the Prevention of Pollution from Ships - This Convention, enacted in 1973, and modified by the Protocol of 1978, is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years. The Convention includes regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from routine operations. The Convention covers not only accidental and operational oil pollution but also pollution by chemicals, goods in packaged form, sewage, garbage and air pollution.

International Convention on Oil Pollution Preparedness, Response and Cooperation - This Convention, enacted in 1990, is intended to establish a global framework for international cooperation in combating major incidents or threats of marine pollution. Parties to the Convention are required to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Ships are required to carry a shipboard oil pollution emergency plan per IMO standards (supplemented in the U.S. and other countries by additional requirements). Operators of offshore units under the jurisdiction of Parties are also required to have oil pollution emergency plans or similar arrangements which must be coordinated with national systems for responding promptly and effectively to oil pollution incidents. Ships are required to report incidents of pollution to coastal authorities and the convention details the actions that are then to be taken. The Convention calls for the establishment of stockpiles of oil spill combating equipment, the holding of oil spill combating exercises and the development of detailed plans for dealing with pollution incidents (again, the U.S. and other parties implement these and other requirements through federal regulations).

² See <http://www.imo.org/home.asp> for further information about the IMO.

Parties to the convention are required to provide assistance to others in the event of a pollution emergency and provision is made for the reimbursement of any assistance provided.

Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances - This Protocol, adopted in 2000, follows the principles of the International Convention on Oil Pollution Preparedness, Response and Cooperation Convention. Like the Convention, the Protocol aims to provide a global framework for international cooperation in combating major incidents or threats of marine pollution. Parties to the Protocol are required to establish measures for dealing with pollution incidents, either nationally or in cooperation with other countries. Ships are required to carry a shipboard pollution emergency plan to deal specifically with incidents involving hazardous and noxious substances.

B. Federal Oil Spill Prevention and Response Programs

The U.S. Coast Guard implements and oversees a number of regulatory programs to prevent and address oil spills, and is recognized as one of the world's premier maritime safety organizations. These regulatory and enforcement programs have dramatically reduced the volume of spills from commercial maritime activities (U.S. Coast Guard Oil Spill Compendium). Such programs are also designed to prepare for and respond to oil spills affecting U.S. waters. Below we briefly summarize some of the relevant aspects and requirements of these programs.

Oil Pollution Act. The Oil Pollution Act (OPA) of 1990, enacted in response to the Exxon Valdez incident, serves as the leading federal regulatory mechanism to prevent, respond to, and address damage caused by oil spills. OPA improved the nation's ability to prevent and respond to oil spills by establishing provisions that expand the federal government's ability, and provide the money and resources necessary, to respond to oil spills. OPA also created the national Oil Spill Liability Trust Fund, which provides up to one billion dollars per spill incident. OPA established new requirements for contingency planning both by government and industry. For example, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) has been expanded in a three-tiered approach: the Federal government is required to direct all public and private response efforts for certain types of spill events; Area Committees -- composed of federal, state, and local government officials -- have developed detailed, location-specific Area Contingency Plans; and owners or operators of certain vessels and facilities that are required and have prepared Response Plans tested by drill and exercise requirements. OPA increased penalties for regulatory noncompliance, broadened the response and enforcement authorities of the Federal government. OPA also requires all tank vessels greater than 5,000 gross tons operating in U.S. waters to be fitted with a double hull before January 1, 2015. Current law establishes a phase-out schedule under which all single-hull tank vessels built before 1979 have already been prohibited from operating in U.S. waters. All vessels that were constructed or that have undergone a major conversion after July 1, 1990 are required to be fitted with a double hull at delivery. The Act's double hull requirements and phase-out schedule were generally accepted by the international community through the International Maritime Organization (IMO) discussed above. Note: new container vessels are voluntarily double hulling fuel tanks to provide similar protections.

Spill Prevention, Control and Countermeasure (SPCC) Plans - In July 2002, the U.S. Environmental Protection Agency (EPA) amended the OPA regulations to incorporate revisions proposed in 1991, 1993, and 1997. Subparts A through C of the Oil Pollution Prevention regulations are referred to as the "SPCC rule" because they describe the requirements for certain facilities to prepare, amend and implement Spill Prevention, Control and Countermeasure (SPCC) Plans. SPCC Plans are a cornerstone of EPA's strategy to prevent oil spills from reaching our nation's waters. Unlike oil spill contingency plans that typically address spill cleanup measures after a spill has occurred, SPCC Plans ensure that facilities put in place containment and other countermeasures that would prevent oil spills that could reach navigable waters. Under EPA's Oil Pollution Prevention regulation, facilities must detail and implement spill prevention and control measures in their SPCC Plans. A spill contingency plan is required as part of the SPCC Plan if a facility is unable to provide secondary containment (e.g., berms surrounding the oil storage tank). Each SPCC Plan, while unique to the facility it covers, must include certain elements. To ensure that facilities comply with the spill prevention regulations, EPA periodically conducts on-site facility inspections. Facilities are now required to submit certain information after having two or more discharges (over 42 gallons) in any 12-month period or a single discharge of more than 1,000 gallons.

Facility Response Plans (FRP) - The Clean Water Act (CWA) as amended by OPA, requires that certain facilities that store and use oil must prepare and submit plans to respond to a worst case discharge of oil and to a substantial threat of such a discharge. EPA has established regulations that define who must prepare and submit an FRP and what must be included in the plan. An FRP is a plan for responding, to the maximum extent practicable, to a worst case discharge of oil and to a substantial threat of such a discharge. The Plan also includes responding to small and medium discharges as appropriate. According to OPA, an owner or operator of a "substantial harm" facility must develop and implement an FRP. A "substantial harm" facility is a facility that, because of its location, could reasonably be expected to cause substantial harm to the environment by discharging oil into or on navigable waters or adjoining shorelines.

Prevention and Enforcement Programs - The U.S. Coast Guard serves as the principle prevention and enforcement authority in marine areas under OPA and related federal laws and regulations including the enforcement of international standards to which the U.S. is signatory. Extensive regulations cover vessel design, construction, equipment, crew competency and operational procedures as well as vessel traffic, anchoring and port specific requirements including such things as safety zones and regulated navigation areas. All reports of hazardous substance releases and oil spills made to the federal government are processed by the National Response Center (NRC). The NRC records and maintains all reports in a computer database called the Emergency Response Notification System, which is available to the public. The NRC relays release information to the U.S. Coast Guard or U.S. EPA Agency On Scene Coordinator (OSC), depending on the location of the incident. In every area of the country, OSCs are on-call and ready to respond to an oil or hazardous substance release at any time of the day. After receiving a report of an oil or hazardous substance release, the federal OSC evaluates the situation and, if the OSC decides that a federal emergency response action is necessary, the National Response System is activated. Alternatively, the OSC will ensure the clean up activities of the responsible party are timely and appropriate or will issue orders or federalize the

response. State and local governments have developed and coordinated additional response procedures.

C. Multi-Jurisdictional Oil Spill Prevention and Response Programs

Supplementing international and federal programs are inter-governmental programs that serve to facilitate coordination between the U.S. and Canada, as well as federal and state jurisdictions. Such programs include the following:

Port State Control – inbound vessels are screened to eliminate substandard vessels. A vessel can be denied entry, be required to implement special operational conditions, targeted for inspection underway, at anchor or at the dock or allowed to proceed. Screening is a risk-based process based designed to target and eliminate substandard operations and ensure compliance with international and federal requirements. Coast Guard District Thirteen covering Washington and Oregon ports has the lowest substandard vessel detention rate of all Coast Guard districts (Coast Guard Annual Port State Control Reports).

Joint U.S./Canada Response Team - In the mid-1980s, Canada and the United States began efforts to reach an agreement to protect and improve their border environment. Both countries recognized that taking steps to prevent chemical accidents along the border helps keep the population and environment safe. These efforts resulted in the development of joint contingency plans.

National Preparedness for Response Exercise Program – The U.S. Coast Guard, the U.S. Environmental Protection Agency, the Research and Special Programs Administration in the U.S. Department of Transportation, and the Minerals Management Service developed the National Preparedness for Response Exercise Program (PREP) to provide guidelines for compliance with OPA pollution response exercise requirements. Consisting of periodic unannounced emergency drills as required by OPA, the PREP guidelines also recommend announced drills. The guiding principles for PREP establish both internal exercises, which are conducted within a plan holder's organization, and external exercises, which extend beyond a plan holder's organization to involve other members of the response community. These exercises are designed to evaluate the entire response mechanism in a given Area to ensure adequate pollution response preparedness. The goal of PREP is to conduct approximately 20 Area exercises per year, with the intent of exercising most Areas of the country over a three-year period. These exercises help insure timely and effective response to oil spill events.

Northwest Area Committee and associated Work Groups - The stated mission of the Northwest Area Committee (NWAC) is to protect public health and safety and the environment by ensuring coordinated, efficient, and effective support of the federal, state, tribal, local, and international responses to significant oil and hazardous substance incidents within the Pacific Northwest Region as mandated by the National Contingency Plan. The NWAC has developed and implemented the NWAC plan and meets regularly to review and improve it through a coordinated effort.

D. State Oil Spill Prevention and Response Programs

The state of Washington, through the Washington Department of Ecology, plays a role in monitoring and implementing oil spill prevention and response programs in Puget Sound. These state programs serve to augment international and federal standards enforced by the U.S. Coast Guard.³ Examples include the following:

Strengthening the State/Coast Guard Partnership - On May 25, 2001, former Governor Gary Locke and 13th U.S. Coast Guard District Commander Admiral Erroll Brown signed a memorandum of agreement on oil spills. This agreement was designed to strengthen federal and state collaborative efforts to prevent and respond to oil spills in Washington's waters. Implementing protocols cover oil spill response, oil transfer monitoring and information sharing among other activities. Other joint initiatives include implementing recommendations from the North Puget Sound Oil Spill Risk Management Panel, managing the risk of oil spills in Haro Strait and on the Columbia River, and working with the Pacific States/British Columbia Oil Spill Task Force.

Vessels and Oil Handling Facilities - There are 35 oil handling facilities and major transmission pipelines in Washington under state regulation. Ecology staff review and approve the facilities' oil spill prevention plans, operation manuals, and certifies personnel training programs to ensure that tanks and pipelines are designed and operated in a manner that will minimize the risk of oil spills. In addition, commercial vessels of a certain size are required to have an oil spill response contingency plans. In June 2006, Ecology proposed new oil transfer standards and oil spill contingency plan rules to incorporate and augment federal standards.

II. Industry-Initiated Safety Practices

Aside from the various regulatory processes outlined above, the marine shipping industry has initiated a number of planning processes to proactively address environmental issues relating to marine shipping. Within Puget Sound, the Associations have been leaders in developing a Harbor Safety Plan to capture and implement best management practices. The Associations have also worked with stakeholders to develop consistency on mitigating ballast water risk. Member companies have supported environmentally-friendly vessel construction programs, developed enhanced crew competency standards, and have implemented safety management and environmental compliance systems on marine vessels. Specific examples of industry-initiated practices include the following:

International Tug of Opportunity System - The "International Tug of Opportunity System" organizes powerful tugboats on both sides of the U.S./Canada International Boundary into a response system for the use of the appropriate coast guard. Through mutual agreements of the industry sectors on both sides of the border, more than 100 tugs were outfitted with electronic

³ Specific Washington laws implemented by Ecology include Chapter 90.56 RCW, Oil and Hazardous Substance Spill Prevention and Response; Chapter 88.46 RCW, Vessel Oil Spill Prevention and Response; Chapter 90.48 RCW, Water Pollution Control; Chapter 88.40, Transport of Petroleum Products - Financial Responsibility; Chapter 70.105 RCW, Hazardous Waste Management Act; Chapter 70.105D RCW, Model Toxics Control Act.

transmitters that made them visible whether they were in or out of radar coverage. This information is provided to the coast guard vessel traffic systems and is used to assist in rapid identification of response resources in the event of an emergency. Recently, new transponder technology (AIS) has expanded this capability to include more tugs over a broader area.

Best Practices. Over the past ten years, Association members have voluntarily engaged in capturing best practices and standards of care implemented via company policies and/or the Harbor Safety Plan. These efforts are made to augment regulatory regimes and provide port specific guidance.

III. Available Technical Information – Risk Assessments and Prevention Studies

A number of recent assessments and studies have been conducted in Puget Sound to evaluate marine vessel traffic and related marine safety issues. Such studies include the International Tug of Opportunity Study,⁴ the Study of Tug Escorts in Puget Sound,⁵ the Port Access Route Study,⁶ and the Port and Waterway Safety Assessment for Haro Strait and Boundary Pass.⁷ These and other recent studies review in detail vessel operation and safety protocols, and make recommendations to reduce the risk of accidents and environmental damage. Implementation of study recommendations over the past ten years through various regulatory programs has further reduced the risk of catastrophic accidents in Puget Sound.

The Associations believe that recent risk assessments and prevention studies conducted in Puget Sound illustrate how the risk of oil spill events have been thoroughly and continuously evaluated and are being comprehensively addressed. Marine vessel operations in Puget Sound are highly regulated, and closely scrutinized. NMFS should closely evaluate these and other relevant studies prior to developing recovery plan recommendations that may result in duplication of these efforts. Doing so will help ensure the Agency accurately characterizes the risks associated with marine vessel operations, and avoids focusing limited resources on highly regulated industrial sectors that have minimized and mitigated their impacts to the maximum extent practicable. Such measures are continuously updated and reviewed to incorporate lessons learned, new technology and the best available information.

⁴ Available at http://www.uscg.mil/hq/g-m/mmc/response/itos_all.pdf

⁵ Available at <http://www.ecy.wa.gov/programs/spills/hottopics/tug/tugstudystuff/FinalReport.pdf>

⁶ Available at <http://www.uscg.mil/D13/oan/pars/sjdf.htm>

⁷ Available at <http://www.navcen.uscg.gov/nwv/projects/pawsa/WorkshopReports/Haro%20Strait.pdf>

IV. Sound and Noise Disturbance Attributed to Marine Vessels

The Conservation Plan suggests that vessel noise may be detrimental to killer whale survival by impairing foraging and other behavior patterns. See Conservation Plan at 83. NMFS recommends that the presence and activity patterns of non-whale-watching vessels in the vicinity of Southern Resident and other killer whales should be evaluated to determine their potential effect. NMFS also suggests the need to establish regulations regarding vessel activity in the vicinity of killer whales should be evaluated.

As the Conservation Plan indicates, the impacts of vessel noise on killer whales, particularly noise associated with large cargo vessels, is poorly understood, and threshold levels at which underwater sounds become harmful are unknown. In 2003 the National Research Council ("NRC") concluded that no documented evidence exists of ocean noise being the direct physiological agent of marine mammal death under any circumstances.⁸ The long-term effects of ambient noise on marine organisms are even less well understood.

The Associations agree with the Conservation Plan and the NRC that no evidence currently exists to suggest that cargo vessel noise is causing direct injury or mortality to killer whales. In view of the considerable uncertainties associated with the effects of vessel noise on marine mammals, it is premature to conclude a need exists for regulatory programs to address this issue. Through the pending recovery plan process, NMFS should clarify the current state of scientific research, and it should avoid suggesting the need for additional regulatory requirements concerning vessel noise until such time that available scientific information demonstrates a causal link between noise and harm to the listed species.

V. Legal Considerations Relevant to Marine Transportation

Cargo and tanker vessel movements are highly regulated by numerous federal laws and international treaties. Vessel movements and shipping lane operations in general implicate important national security considerations and international agreements. NMFS' legal authority to regulate in this complex legal environment is at best unclear. The Associations believe that any proposed recovery plan should carefully evaluate these issues through discussions with the State Department, the Defense Department, the Department of Homeland Security and the shipping industry to ensure that any recovery plan recommendations reflect a realistic assessment of actions that can in fact be implemented.

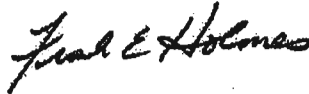
⁸ National Research Council, *Ocean Noise and Marine Mammals*, Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals (2003).

VI. Procedural Avenues for Further Discussion

As discussed above, the Associations encourage NMFS to engage with the Associations and other stakeholders over the Agency's development of a proposed recovery plan for Southern Resident killer whales. Operation and regulation of marine vessels in Puget Sound is a complex arena, and many existing programs, laws, regulations, and policies likely address the needs of the listed species and the Agency. The Associations suggest that NMFS formulate a recovery team consisting of experts from the military, industry, state and federal government, and other sectors to assist the Agency in its development of a recovery plan.⁹ Doing so will help ensure that any recovery plan reflects thoughtful consideration of those risks that are reasonably foreseeable in view of existing regulatory and non-regulatory marine safety and facility operation regimes.

Thank you for the opportunity to provide preliminary comments and recommendations concerning the development of a draft killer whale recovery plan. Please feel free to contact Frank Holmes, WSPA at (360) 352-4506, or Mike Moore, PMSA at (206) 441-9700 if you have any questions regarding these comments or recommendations.

Sincerely,



Frank E. Holmes, Northwest Manager
Western States Petroleum Association



Michael R. Moore, Vice President
Pacific Merchant Shipping Association

Enclosures

⁹ The Associations believe that a recovery team should consist of knowledgeable experts from the United States and Canadian environmental agencies, the military, industry, academia, and environmental groups. Similar to NMFS' salmon recovery planning efforts, the Agency could establish both technical and policy advisory groups to ensure the range of relevant issues are considered during recovery plan development.

~~Cc: Rear Admiral Richard R. Houck, Commander~~
~~13th Coast Guard District~~
~~United States Coast Guard~~

Rear Admiral William D. French, Commander
Navy Region Northwest
United States Navy

Patrick Jones, Executive Director
Washington Public Ports Association

W. Michael Anderson, Executive Director
Washington State Ferries

Rick Bryant, President
Chamber of Shipping of British Columbia

Appendix A. Technical Comments Concerning Proposed Orca Conservation Plan

The Western States Petroleum Association provides the following additional technical comments and information concerning the proposed killer whale conservation plan.

I. Prey Availability

The 2004 Southern Resident Killer Whale Status Review indicates that when the killer whales are in the Puget Sound region, salmon provide their major prey. See 2004 Status Review at p. 29. The Conservation Plan notes current data showing that they preferentially target Chinook salmon. See Conservation Plan at 62. Less is known about the killer whales' food sources during the winter and early spring, when they are outside the region. However, the Status Review and the Conservation Plan both note that sightings of Southern Residents off Monterey Bay, California and Westport, Washington corresponded to strong Chinook salmon runs in those areas. The Conservation Plan also suggests that, though the evidence is limited, Columbia River salmon are likely an important winter and early spring food source for the Southern Residents.

At least one of the studies cited in the Conservation Plan, Ford, et al. (2005),¹ suggests not only that Chinook are an important year-round food source for resident killer whales, but also that resident killer whale population fluctuations in the last two decades strongly correlate to fluctuations in Chinook salmon abundance. The same study notes that sockeye and pink salmon are not important prey for killer whales, but fall migrating chum may be significant during a period in the fall. Still, chum salmon abundance does not correlate to changing killer whale population levels in the same way as shifting Chinook abundance.

The discussion of salmon in the Conservation Plan, while recognizing that they are essential prey, focuses mainly on what is known about trends in salmon populations: the condition of native salmon stocks, and the degree to which hatchery salmon supplement their numbers. It contains only a limited discussion of the nutritional value of salmon as a food source for killer whales. For example, it notes that Chinook salmon have an energy content of 2,220 kcal/kg, while smaller chum and pink salmon have energy contents of 1,390 kcal/kg and 1,190 kcal/kg, respectively. See Conservation Plan at 68. This information is presented in isolation, without any further analysis. There is no real evaluation of whether the available food supply is adequate for a rebuilding killer whale population, which is a major shortcoming of the Conservation Plan.

¹ Ford, J.K.B., G.M. Ellis, P.F. Olesiuk, 2005, Linking prey and population dynamics: did food limitation cause recent declines of 'resident' killer whales (*Orcinus orca*) in British Columbia? Fisheries and Oceans Canada, Canadian Science Advisory Secretariat 2005/042.

The same study that the Conservation Plan cites for the energy content of different salmon species, Osborne (1999),² also contains estimates of the energy requirements of killer whales, ranging from 85,000 kcal/day for juveniles to 200,000 kcal/day for adult males. To meet these needs, Osborne estimated that adult killer whales must consume the equivalent of 28 to 34 adult salmon daily, while those under 13 years old need 15 to 17 adult salmon daily. NMFS should use this information to project the dietary needs of the killer whales, both at their current numbers, and as a recovered population.

It is not difficult to develop working estimates based on Osborne's work. Given the current size of the Southern Resident population, collectively they consume the equivalent of 750,000 to 800,000 adult salmon annually.³ The Southern Residents primarily, but not exclusively, eat salmon, so some of this caloric input comes from other prey. This analysis obviously can be refined, but it certainly demonstrates the relative magnitude of their food needs, and provides a useful point of comparison when evaluating data on salmon stocks.

For example, the Conservation Plan indicates that adult Chinook runs returning to Puget Sound, including hatchery fish but excluding the depressed spring runs, have ranged between 118,000 and 280,000 since the early 1990s. Frazier River Chinook runs have been of a similar size. See Conservation Plan at p. 64. As Chinook are the Southern Resident's most commonly targeted prey, if the Chinook are available to them, they easily could consume a significant share of the Chinook production from the Frazier and Puget Sound rivers combined, even at current killer whale population levels, and even though they are in region primarily from April to November.

It also is apparent from this data that, while Southern Residents may prefer Chinook, they also must rely on other, more abundant salmon species, which also have lower energy content. For example, as Ford, et al. (2005) indicates, chum provide an important food source during part of the fall, although even then killer whales appear to consume Chinook. The lower energy content of other species translates to lower nutritional benefit for the same hunting effort. Whether the current availability of Chinook produces nutritional stress in the existing killer whale population apparently remains unknown, although Ford, et al. (2005) indicates a likely connection to killer whale population levels. This certainly suggests that prey availability is a potential limitation on increasing the killer whale population. There can be no sustainable increase in that population without an adequate food supply.

In developing a recovery plan, NMFS should evaluate whether there is sufficient prey in the region to support an increase in the killer whale population, including what

² Osborne, R.W., 1999, A historical ecology of Salish Sea "resident" killer whales (*Orcinus orca*): with implications for management. PhD thesis. University of Victoria, Victoria, British Columbia.

³ Osborne presents much the same estimate (750,000 salmon to feed 80 orcas) in a newsletter article available online: "Are the Orcas Finding Enough Salmon in Winter," <http://www.skagitfisheries.org/PastNews/newOrcas.htm>.

food supply would be needed by a recovered population, and not simply rely on the Conservation Plan's general discussion of trends in salmon populations. This analysis should not wait for the suggested further research on historic prey abundance and distribution. See Conservation Plan at p. 125. The Conservation Plan acknowledges that historical population data is difficult to interpret and to compare to data from other periods. Those difficulties will remain, and should not prevent NMFS from separately considering the energy needs of a recovered population. NMFS also should pursue the Conservation Plan's suggested research on potential seasonal or periodic shortfalls in critical prey. Spring Chinook runs have declined significantly throughout the region, potentially depriving killer whales of important prey. The Conservation Plan's comment that hatchery-origin resident blackmouth may provide substitute prey is highly speculative, and not supported by any sort of quantitative analysis.

The Conservation Plan is particularly weak in the conservation measures it proposes for improving the availability of prey for the killer whales. They focus almost exclusively on measures already under development for rebuilding depressed native salmon populations. These efforts are expected to take decades to produce meaningful increases in salmon numbers. For example, Shared Strategy's habitat-focused salmon recovery plan for Puget Sound assumes fifty years will be needed to recover Puget Sound's native Chinook population. If, as NMFS suggests, food supply is limiting prospects for recovery of the Southern Resident killer whales, then it is inappropriate to rely almost exclusively on plans that will not increase that food supply for several decades.

II. Contaminants of Concern

The Conservation Plan identifies the bioaccumulation of organochlorines, such as PCBs, DDT, and some other pesticides, as posing the greatest contaminant risk to killer whales, Conservation Plan at p. 72, and most of the Plan's discussion of risks posed by contaminants (pp. 72-82) is focused on these compounds. Since neither PCBs nor DDT remain in use in the Puget Sound region, addressing the threats posed by these contaminants is likely to require focused and specialized responses. However, the proposed conservation measures are stated far more broadly. For example, measure 1.2.2 simply calls for "minimiz[ing] continued input of contaminants to the environment," and measure 1.2.2.1 calls for revising water and sediment quality standards and upgrading wastewater treatment systems and pretreatment programs.

The Conservation Plan does not make the case for wholesale revisions to water quality standards and changes to wastewater treatment systems. It also fails to explain how these changes would address PCBs and DDT, substances which persist in the environment but as already noted, are no longer in use. Similarly, no case has been made for sweeping changes to water quality and wastewater treatment standards to respond to emerging contaminants, like PBDEs. In developing a recovery plan, NMFS should focus any contaminant-related conservation measures on specific responses to the contaminants of concern.

Appendix B. Draft Summary of Regulatory and Non-Regulatory Measures

The Pacific Merchant Shipping Association provides the following draft summary of relevant regulatory and non-regulatory measures that require consideration in the proposed killer whale conservation plan.

International Regulatory Programs

IMO – Safe, secure and efficient shipping on clean oceans

Because of the international nature of the shipping industry, it had long been organized that action to improve safety in maritime operations would be more effective if carried out at an international level rather than by individual countries acting unilaterally and without coordinating with others. Although a number of important international agreements had already been adopted, many States believed that there was a need for a permanent body which would be able to coordinate and promote further measures on a more regular basis.

It was against that background that a conference held by the United Nations in 1948 adopted a convention establishing the International Maritime Organization(IMO) as the first ever international body devoted exclusively to maritime matters (the original name was the Inter-Governmental Maritime Consultative Organization, or IMCO, but the name was changed in 1982 to IMO).

In order to achieve its objectives IMO has, in the last 30 years, promoted the adoption of some 30 conventions and protocols and adopted well over 700 codes and recommendations concerning maritime safety, the prevention of pollution and related matters.

IMO Convention

- Adopted Geneva 1948
- Entered into force 1958
- First IMO meeting 1959

IMO Organization

- Assembly
- Council
- Committees
 - Marine Safety Committee (MSC) is the most senior of the committees that carry out the Organization's technical work. It has a number of subcommittees whose titles indicate the subjects they deal with: Safety of Navigation; Radio communications; Life-Saving, Search and Rescue; Training and Watchkeeping; Carriage of Dangerous Goods; Ship Design and

Equipment; Fire Protection; Stability and Load Lines and Fishing Vessel Safety; Containers and Cargoes; and Bulk Chemicals.

- Marine Environmental Protection Committee (MEPC) was established by the Assembly in November 1973. It is responsible for coordinating the Organization's activities in the prevention and control of pollution of the marine environment from ships. The Sub-Committee on Bulk Chemicals is also a subcommittee of the MEJPC as far as pollution is concerned.
- Legal Committee was originally established to deal with the legal problems arising from the Terry Canyon accident of 1967, but it was subsequently made a permanent committee. It is responsible for considering any legal matters within the scope of the Organization.
- Technical Cooperation Committee is responsible for coordinating the work of the Organization in the provision of technical assistance in the maritime field, in particular to the developing countries. The importance of technical assistance in IMO's work is shown by the fact that it is the first organization the United Nations system formally to recognize a Technical Cooperation Committee in its Convention.
- Facilitation Committee is responsible for IMO's activities and functions relating to the facilitation of international maritime traffic. These are aimed at reducing the formalities and simplifying the documentation required to ships when entering or leaving ports or other terminals.
- Subcommittees
 - Bulk Liquids and Gases
 - Carriage of Dangerous Goods, Solid Cargoes and Containers
 - Fire Protection
 - Flag State Implementation
 - Radio Communications and Search and Rescue
 - Safety of Navigation
 - Ship Design and Equipment
 - Stability, Load Lines and Fishing Vessel Safety
 - Standards of Training and Watchkeeping

Importance of international standards

- Shipping – international
- Underpins world trade
- Assets move between jurisdictions
- Universally applicable standards

Almost every aspect of shipping covered

- Design
- Construction
- Equipment
- Maintenance
- Operations
- Security
- Crew

Global coverage

- 166 Member States
- All major ship owning nations
- All major coastal states
- IGOs and NGOs

Application to world tonnage

- | | |
|--------------|--------|
| • SOLAS | 98.79% |
| • Load Lines | 98.76% |
| • MARPOL | 97.55% |
| • COLREGS | 97.92% |
| • STCW | 98.78% |

Safety of Life at Sea (SOLAS)

The first conference organized by IMO in 1960 was, appropriately enough, concerned with safety. That conference adopted the International Convention on Safety of Life at Sea (SOLAS), which came into force in 1965, replacing a version adopted in 1948. The 1960 SOLAS Convention covered a wide range of measures designed to improve the safety of shipping. They included subdivision and stability; machinery and electrical installations; fire protection, detection and extinction; lifesaving appliances; radiotelegraphy and radiotelephone; the safety of navigation; the carriage of grain; the carriage of dangerous goods; and nuclear ships.

The 1960 SOLAS Convention was the basic international instrument dealing with matters of maritime safety and, in response to new developments, it was amended several times. However, because of the rather difficult requirements for bringing amendments into force, none of these amendments actually became binding internationally.

To remedy this situation and maybe introduce the needed improvements more speedily, in 1974 IMO convened a conference to adopt a new International Convention for the Safety of Life at Sea which would incorporate the amendments adopted to the 1960 Convention as well as introduce other changes, including an improved amendment

procedure. Under the new procedure, amendments adopted by the MSC enter into force on a predetermined date, unless objected to by a specific number of States.

The Convention adopted by this Conference, the 1974 SOLAS Convention, entered into force on 25 May 1980.

Since entering into force, the Convention has been modified on a number of occasions, some of which are indicated below:

- 1981 amendments: Chapters II-I and II-2, which deal respectively with construction and fire safety, were virtually rewritten. Entered into force in 1984.
- 1983 amendments: Chapter III, which deals with lifesaving appliances, was completely rewritten and changes made to a number of other regulations. Entered into force in 1986.
- 1988 (April) amendments: Changes were introduced as a consequence of the consequence of the capsizing of the ferry Herald of Free Enterprise, and were intended to improve the safety of ro-ro passenger ships. Entered into force in 1989.
- 1988 (October) amendments: Amendments were adopted which also aimed to improve passenger ship safety. The most important change was designed to improve the stability of passenger ships after damage. Entered into force in 1990.
- 1988 (GMDSS) amendments: Amendments were adopted to introduce the global maritime distress and safety system (GMDSS), the biggest change to maritime communications since the introduction of radio. The amendments entered into force in February 1992 but will be phased in between then and 1999.
- 1989 amendments: The amendments mainly concern watertight doors and fire safety. Entered into force in 1992.
- 1990 amendments: The amendments concern the way in which the subdivision and damage stability of dry cargo ships is calculated. Entered into force in 1992.
- 1991 amendments: One group of amendments deals with fire safety on passenger ships; the other extends chapter VI, which only deals with grain, to other dry cargoes; a third deals with pilot safety. Entered into force in 1994.
- 1992 amendments: The amendments deal with the stability of existing passenger ro-ro ships and the fire protection of passenger ships. These amendments entered into force in 1994. Additionally, two protocols were adopted to the Convention: the 1978 Protocol, which modified inspection and survey procedures and introduced mandatory annual surveys and outside inspections of bottoms for tankers (in force since 1981), and the 1988 Protocol, which introduced the harmonized system of survey and certification, among other things, which entered into force in 2000.

Prevention of Pollution from Ships (MARPOL)

The 1954 Oil Pollution Convention was the first major convention designed to curb the impact of oil pollution. But in the years that followed, the pollution threat

increased dramatically and, since coming into existence, IMO has devoted increasing attention to the problem of marine pollution. The 1954 Convention was amended in 1962, but the wreck of the TORREY CANYON in 1967 dramatically alerted the world to the great dangers which the transport of oil posed to the marine environment.

Following the TORREY CANYON disaster, IMO produced a series of conventions and other instruments, including further amendments to the 1954 Convention which were adopted in 1969.

In 1969 two conventions were adopted. One was the International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, which established the right of coastal States to intervene in incidents on the high seas which are likely to result in oil pollution. It entered into force in 1975.

The second was the International Convention on Civil Liability for Oil Pollution Damage, which deals with the civil liability of the owner of a ship or cargo for damage suffered as a result of an oil pollution incident. The Convention is intended to ensure that adequate compensation will be readily available to victims of pollution, and places the obligation for paying such compensation on the shipowner. That Convention also entered into force in 1975.

It was felt by some Governments that the liability limits established by this system were too low, and that the compensation made available could, in some cases, prove to be inadequate. As a result, another conference was convened by IMO in 1971 which adopted the Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage. This Convention came into force in 1978.

Unlike the Civil Liability Convention, which puts the onus on the shipowner, the IOPC Fund is designed to provide additional compensation to victims where an accident results in pollution damage which exceeds the compensation available under the Civil Liability Convention. Thus the burden of compensation is spread evenly between shipowners and cargo interests. The Fund is operated by an International Oil Pollution Compensation Fund Organization, which has its headquarters in London.

The limits of liability in the 1969 Civil Liability and 1971 Fund Conventions were increased in protocols to amend them which were adopted by a conference convened by IMO in 1984.

In addition to the conventions dealing with the legal aspects of oil pollution, IMO gave attention to other aspects as well. The continuing boom in the transportation of oil and the increasing scale of oil pollution incidents resulted in serious international concern for the marine environment, not only as a result of accidents but also through routine tanker operations, notably the cleaning of cargo tanks.

In 1971, the 1954 Oil Pollution Convention was further amended to limit the hypothetical outflow of oil resulting from an accident and also to provide special protection for the Great Barrier Reef of Australia. However, it was generally felt that a completely new instrument was required to control pollution of the seas from ships.

In 1973, IMO convened a major conference to discuss the whole problem of marine pollution from ships. It resulted in the adoption of the first ever comprehensive anti-pollution convention, the International Convention for the Prevention of Pollution

from Ships (MARPOL). The Convention deals not only with pollution by oil, but also pollution from chemicals, other harmful substances, garbage and sewage.

The MARPOL Convention greatly reduces the amount of oil which can be discharged into the sea by ships, and bans such discharges completely in certain areas (such as the Black Sea, Red Sea and other regions). It gives statutory support for such operational procedures as "load on top" (which greatly reduces the amount of mixtures which have to be disposed of after tank cleaning) and segregated ballast tanks.

Certain technical problems made it difficult for many States to ratify the Convention. In the meantime, a series of tanker accidents in the winter of 1976/77 led to demands for further action. IMO responded to these demands and took rapid steps to convene the Conference on Tanker Safety and Pollution Prevention in 1978.

The TSPP Conference in 1978 adopted a Protocol to the 1973 MARPOL Convention which introduced further measures, including requirements for such operational techniques as crude oil washing (a development of the earlier "load on top" system) and a number of modified design and construction requirements such as protectively located segregated ballast tanks. The Protocol of 1978 relating to the 1973 MARPOL Convention in effect absorbs the parent Convention with modifications. This combined instrument is commonly referred to as MARPOL 73/78. It entered into force in October 1983. The Convention has been amended on several occasions since then.

In 1990, IMO adopted the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC). It is designed to improve the ability of nations to cope with a sudden emergency, such as a tanker accident. It entered into force in 1995; however, some of its provisions were used as the basis for IMO's response to the massive pollution of the Persian Gulf resulting from hostilities in the area in the spring of 1991. These measures, assisted by a special IMO fund, helped to save many ecologically important sites from major damage.

Regulations for Preventing Collisions at Sea (COLREGS)

Among the most common causes of accidents at sea are collisions. Regulations for preventing collisions were adopted by the 1960 Traffic separation schemes, like the one in the Dover Strait, have helped to reduce the number of collisions in many parts of the world. The TSS for the Strait of Juan de Fuca was adopted in 1981 and implemented in 1982. The TSS for approaches to Puget Sound and approaches was adopted in 1992 and implemented in 1993. Revisions to these TSS's and the addition of a TSS for Haro Strait and Boundary Pass were adopted and implemented in 2002. The latter revisions were the direct result of Port Access Route Study in which the community was invited to participate.

The early TSS rules were not part of the SOLAS Convention and were therefore not legally binding internationally. In 1972, IMO adopted new International Regulations for Preventing Collisions at Sea (COLREG). These include a number of new features including a provision which made traffic separation schemes adopted by IMO mandatory. Traffic separation schemes have been introduced throughout the world where maritime traffic has been particularly congested.

Standards for Training, Certification and Watchkeeping (STCW)

The safety of life at sea, the marine environment and over 80% of the world's trade depends on the professionalism and competence of seafarers.

The IMO's International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 was the first internationally-agreed Convention to address the issue of minimum standards of competence for seafarers. It established basic requirements on training, certification and watchkeeping for seafarers on an international level. Previously the standards of training, certification and watchkeeping of ships personnel were established by individual governments, usually without reference to practices in other countries. As a result, standards and procedures varied widely, even though shipping is the most international of all industries. In 1995, the STCW Convention was completely revised and updated to clarify the standards of competence required and provide effective mechanisms for enforcement of its provisions. STCW 95, as it is referred to, entered into force in 1997.

In 1997, IMO adopted a resolution setting out its vision, principles and goals for the human element. The human element is a complex multi-dimensional issue that affects maritime safety, security and marine environmental protection involving the entire spectrum of human activities performed by ships' crews, shore based management, regulatory bodies and others. All need to cooperate to address human element issues effectively.

International Safety Management (ISM) Code

Since the 1980s IMO has increasingly addressed the people involved in shipping in its work. In 1989, IMO adopted *Guidelines on management for the safe operation of ships and for pollution prevention* - the forerunner of what became the International Safety Management (ISM) Code which was made mandatory through the International Convention for the Safety of Life at Sea, 1974 (SOLAS).

The ISM Code is intended to improve the safety of international shipping and to reduce pollution from ships by impacting on the way shipping companies are managed and operated. The ISM Code establishes an international standard for the safe management and operation of ships and for the implementation of a safety management system (SMS).

Effective implementation of the ISM Code should lead to a move away from a culture of "unthinking" compliance with external rules towards a culture of "thinking" self-regulation of safety - the development of a 'safety culture'. The safety culture involves moving to a culture of self regulation, with every individual - from the top to the bottom - feeling responsible for actions taken to improve safety and performance.

IMO Codes and Recommendations

In addition to conventions and other formal treaty instruments IMO has adopted several hundred recommendations dealing with a wide range of subjects. Some of these constitute codes, guidelines or recommended practices on important matters not considered suitable for regulation by formal treaty instruments. Although recommendations -- whether in the form codes or otherwise -- are not usually binding on governments, they provide guidance in framing national regulations and requirements. Many governments do in fact apply the provisions of the recommendations by

~~incorporating them, in whole or in part, in national legislation or regulations. In some cases, important codes have been mandatory by including appropriate references in a convention.~~

These recommendations are generally intended to supplement or assist the implementation of the relevant provisions of the conventions and, in some cases, the principal codes, guidelines, etc. In appropriate cases the recommendations may incorporate further requirements which have been found to be useful or necessary in the light of experience gained in the application of the previous provisions. In other cases, they clarify various questions which arise in connection with specific measures and thereby ensure their uniform interpretation and application in all countries.

Examples of the principal recommendations, codes, etc., adopted over the years are:

- International Maritime Dangerous Goods Code (IMDG Code) (First Adopted In 1965);
- Code of Safe Practice for Solid Bulk Cargoes (1965);
- International Code of Signals (all functions in respect of the Code were assumed by the Organization in 1965);
- Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (1971);
- Code of Safe Practice for Ships Carrying Timber Deck Cargoes (1973);
- Code of Safety for Fishermen and Fishing Vessels (1974);
- Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (1975);
- Code of Safety for Dynamically Supported Craft (1977);
- Code for the Construction and Equipment of Mobile Offshore Drilling Units (1979);
- Code on Noise Levels on Board Ships (1981); Code of Safety for Nuclear Merchant Ships (1981);
- Code of Safety for Special Purpose Ships (1983);
- International Gas Carrier Code (1983);
- International Bulk Chemicals Code (1983);
- Code of Safety for Diving Systems (1983);

Federal Regulatory Programs

Statutory

- Operation of the Coast Guard
 - Treasury Department
 - The Act of January 28, 1915, ch. 20, sec. 1, 14 U.S.C. 1, created Coast Guard by combining the Lifesaving Service with the Revenue Cutter Service.

-
- ~~A branch of the armed forces and a military service within the Treasury Department, except when it is operating as a service in the Navy.~~
 - Vested in the Secretary the authority and power to delegate the performance of any of his/her functions, with certain exceptions, to any officer, agency, or employee within the Department.
 - Department Of Transportation (DOT)
 - P.L. 89670, sec. 6 (formerly 49 U.S.C. 1655(b)(1), now 49 U.S.C. 108(a)) transferred Coast Guard to DOT in 1967
 - Department of Homeland Security (DHS)
 - The Coast Guard transferred to DHS on March 1, 2003
 - General Activities
 - The Secretary of the Department in which the Coast Guard operates is authorized to confer Coast Guard related duties and powers upon the Commandant, and to promulgate regulations as deemed appropriate to carry out provisions of law applicable to the Coast Guard
 - To execute his vested powers and authority, the Commandant may delegate duties and authority to personnel and issue rules, orders, and instructions (not in conflict with law) concerning the internal organization, administration, and personnel of the Coast Guard.
 - Captain of the Port (COTP)
 - Under 14 U.S.C. 634(a), the Commandant is authorized to designate any officer (including a warrant or petty officer), as a "captain of the port" for such ports or adjacent high seas or water over which the U.S. has jurisdiction as he deems necessary, to facilitate execution of Coast Guard duties prescribed by law.
 - Executive Order No. 10173, presently found in title 33, CFR, part 6 and Article 322 of Coast Guard Regulations further describe the COTP as the officer designated by the Commandant to give immediate direction to Coast Guard law enforcement activities within an assigned area.
 - Officer in Charge of Marine Inspection (OCMI)
 - On 28 February 1871, a Congressional enactment (16 Stat. 440) reorganized the Steamboat Inspection Service and established and defined the types, duties, and hierarchy of marine inspectors
 - Enactment of this legislation centralized administration of the service in the office of a Supervising Inspector General. A Board of Local Inspectors was empowered and required to:
 - Review suitability of the hulls of steam vessels and their equipment at least once a year

- ~~Review strength, form, suitability, etc., of boilers and machinery fittings on all steam vessels, at least once a year~~
 - Subject vessel boilers to prescribed standards of hydrostatic testing
 - Issue prescribed certificates attesting to the vessel's compliance with standards to proper authorities
 - License and classify masters, mates, and officers of all steam vessels
 - Investigate acts of incompetence or misconduct committed by any licensed officers while acting under authority of their licenses, and to revoke or suspend such licenses if any provision of applicable law had been violated
 - Examine arriving and departing vessels, as often as necessary, to detect noncompliance with requirements of law and defects that had become apparent since the last inspection
- Steamboat Inspection Service was transferred from the Treasury Department to the Department of Commerce and Labor in 1903
- In 1913, this Department was split into the Department of Labor and the Department of Commerce; the latter became the new home of the Steamboat Inspection Service
- On June 30, 1932, the Steamboat Inspection Service was combined with the Bureau of Navigation to form the Bureau of Navigation and Steamboat Inspection; in 1936, this Bureau was redesignated the Bureau of Marine Inspection and Navigation (BMIN)
- On February 28, 1942, Executive Order No. 9083, Federal Register 1609 (1942) transferred BMIN to the Coast Guard for the duration of the Second World War. Reorganization Plan No. 3 of 1946, 60 Stat. 1097, made this transfer permanent and abolished the BMIN and its designations of various inspectors
- Postwar 9/11 reorganization moved Coast Guard into DHS on March 1, 2003
- Under present law, the authority is granted by Title 46 U.S.C. to the Secretary of the Department in which the Coast Guard is operating. The Secretary has delegated the authority to the Commandant and the Commandant has further delegated it to the OCMi (33 CFR 1.0120).
- **Federal On-Scene Coordinator (FOSC)**
 - Enabling authority for the OSC is derived from the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 CFR 300)
 - Mandates the coordination and direction of federal pollution control efforts at the scene of discharge of oil or release of hazardous substances to be accomplished through an OSC, who shall be predesignated

- Environmental Protection Agency (EPA) and the Coast Guard are required to ensure that OSC's are predesignated for all areas within a given region
- EPA furnishes OSC's for the inland zone
- Coast Guard furnishes OSC's for the coastal zone; waters subject to the tide, the contiguous zone, certain other offshore waters (generally out to 200 miles [370.4 kilometers]), the Great Lakes, and specified ports and harbors on inland rivers
- Under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), the OSC also has jurisdiction over hazardous substance releases on land, into ambient air, affecting groundwater, or land surfaces included in the coastal zone
- **Specific Authorities for Vessel Inspection and Licensing/Certification of Vessel Personnel**
 - In August 1983, Coast Guard-administered portions of Title 46, U.S.C. were revised, consolidated, and enacted as "positive law." Reorganized and restated laws in subject matter categories useful to marine safety personnel. Basic organization as follows:
 - Federal Water Pollution Control Act of 1972, as amended (FWPCA) and
 - Comprehensive Environmental Response, Compensation, and Liability Act, as amended (CERCLA)
 - Charge the Coast Guard to prepare for and respond to marine pollution incidents, coordinating public and private response efforts
 - Under the Act to Prevent Pollution From Ships (ratification of the international MARPOL 73/78 protocols) and the FWPCA the Coast Guard has promulgated comprehensive shipboard and waterfront facilities pollution prevention regulations. The Coast Guard inspects U.S. and foreign vessels for compliance with these standards and procedures.
 - Ports and Waterways Safety Act of 1972 (PWSA), as amended by the Port and Tanker Safety Act of 1978, provides local Coast Guard Captains of the Port (COTP) with authority to control the activities of vessels and waterfront facilities. This includes:
 - Issuing COTP orders
 - Promulgating safety zones and regulated navigation areas
 - Establishing vessel traffic services (VTS)
 - Directing or prohibiting vessel movements and facility activities
 - Other applicable Laws and Regulations. Besides the statutes listed above, Coast Guard authority and jurisdiction in the marine environmental protection program is derived from the following statutes and regulations. As the nation's maritime law enforcement agency per 14 U.S.C. 89, the Coast Guard

may enforce any U.S. law, coordinating actions with appropriate federal, state, or local agencies.

- Clean Water Act of 1977
- The Act to Prevent Pollution From Ships (ratification of the international MARPOL 73/78 protocols)
- Deep Water Port Act, as amended
- Refuse Act of 1899
- Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA) (Domestic legislation implementing the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (London Dumping Convention of 1972))
- Outer Continental Shelf Lands Act (OCSLA), as amended
- Hazardous Material Transportation Act (HMTA)
- The International Safe Container Act
- Subtitle II of Title 46 United States Code (46 U.S.C. 3701-3718; 33 CFR 157)
- Intervention on the High Seas Act
- Shore Protection Act of 1988
- Marine Plastic Pollution Research and Control Act of 1987 (Ratification of optional Annex V of MARPOL 73/78)
- Ocean Dumping Ban Act of 1988
- Trans-Alaska Pipeline Authorization Act (TAPAA)
- Rivers and Harbors Act of 1899, as amended
- Coastal Zone Management Act of 1972
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
- OPA 90 Title 1; and
- Hazardous Materials Transportation Uniform Safety Act (HMTUSA)
- **Authority for the Port Safety And Security (PSS) Program** -- The specific statutes and regulations authorizing Coast Guard PSS activities are divided into two basic groups. They are:
 - Port Security responsibilities are derived from:
 - Espionage Act (40 Stat. 220) as amended
 - Magnuson Act (64 Stat. 427; and
 - Ports and Waterways Safety Act (PWSA).
 - Port Safety responsibilities are derived from:

- Ports and Waterways Safety Act (PWSA)
- Subtitle II of Title 46
- Hazardous Materials Transportation Act (HMTA)
- 33 CFR 160 Ports and Waterways Safety General; and
- 33 CFR 165 Regulated Navigation Areas and Safety Zones.
- **Authority for the Bridge Administration (BA) Program --** The laws governing the construction, operation, and alteration of bridges over the navigable waters of the United States were first administered by the U.S. Army Corps of Engineers (USACE). The Coast Guard administered the approval of bridge lighting. With the formation of DOT, certain functions, duties, and responsibilities of the Secretary of the Army were transferred to the SECDOT on April 1, 1967. The authority to administer these laws was delegated to the Commandant of the Coast Guard by Section 1.46 of Title 49, CFR. Parts of this authority have been further delegated by the Commandant to the district commanders by 33 CFR 1.01 and 1.05.
- **Specific Authority For The Recreational Boating Safety (RBS) Program --** The primary authority for the RBS Program came from the Federal Boat Safety Act of 1971. The provisions of this act have been codified in Title 46, U.S.C.

International Non-Regulatory Programs

An organization with a "safety culture" is one that gives appropriate priority to safety and realizes that safety has to be managed like other areas of the business. For the shipping industry, it is in the *professionalism* of seafarers that the safety culture must take root.

That culture is more than merely avoiding accidents or even reducing the number of accidents, although these are likely to be the most apparent measures of success. In terms of shipboard operations, it is to do the right thing at the **right** time in response to normal and emergency situations. The quality and effectiveness of that training will play a significant part in determining the attitude and performance - the professionalism - the seafarer will subsequently demonstrate in his, or her, **work**. And the attitude adopted will, in turn, be shaped to a large degree by the 'culture' of the shipping company.

The key to achieving that safety culture is in:

- recognizing that accidents are preventable through following correct procedures and established best practice;
- constantly thinking safety; and
- seeking continuous improvement.

It is relatively unusual for new types of accidents to occur on board and many of those that continue to occur are due to unsafe acts by seafarers. These errors, or more often violations of good practice or established rules, can be readily avoided. Those **who make** them are often well aware of the errors of their ways. They may have taken short-cuts they should not have taken. Most will have received training aimed at preventing them but, through a culture that is tolerant to the 'calculated risk', they still occur.

The challenge for trainers and training, and managers ashore and afloat, is how to minimize these unsafe acts, how to instill not only the skills but also the attitudes necessary to ensure safety objectives are met. The aim should be to inspire seafarers towards firm and effective self-regulation and to encourage personal ownership of established best practice. Internationally recognized safety principles and the safeguards of best industry practice have to become an integral part of an individuals' own standards.

- Industry Programs & Best Practices
 - ISO 14001
 - Standards of Care
- Harbor Safety Committee
 - See Harbor Safety Plan
 - Risk Management Approach; Incident Review
 - Coast Guard program overview; see Stewardship Report
- Joint Coordinating Group
- Cooperative Vessel Traffic Service
- Vessel Traffic Service User Group meetings
- Pilot Commission Meetings
 - Pilot Standards and Procedures
 - Incident Review & Recommendations

- Area Maritime Security Committee
 - Port Security Committees
 - Coast Guard Forums
- Pacific States/BC Oil Spill Task Force
- NW Straits Commission
- Olympic Coast National Marine Sanctuary Advisory Committee

Emissions

- State of Washington Ballast Water Work Group
- Pacific Ballast Water Group
- Puget Sound Marine Emissions Group
- West Coast Diesel Emissions Reduction Collaborative
- Cruise Ship Memorandum of Agreement
- Port Commission Meetings (many)

Prevention - Studies

- North Puget Sound Risk Management Panel
 - (RCAC not included in recommendations - see document)
- Scoping Risk Assessment - Protection Against Oil Spills in Marine Waters of NW Washington State
- International Tug of Opportunity Study
- Tug Needs Study
- Port Access Route Study (Traffic Lane Adjustment)
- Haro Strait Risk Assessment
- Waterway Assessment - Aids to Navigation

EXHIBIT B

Polyaromatic Hydrocarbons and Southern Resident Killer Whales August 11, 2006

**Jay Brueggeman
Canyon Creek Consulting
1147 21st Ave. E
Seattle, WA 98112
206/324-6292 (office)
206/200-2053 (cell)
jaycanyoncreek@aol.com**

An overview of polyaromatic hydrocarbons (PAHs) is provided below followed by an assessment of their effects on the southern resident killer whale population and its prey in Washington state waters. The overview includes a description of the sources, pathways, metabolism, and toxicity of PAHs on mammals, fish, and invertebrates. Little is published on killer whales and even much less on the southern resident killer whale population. Since this population is unusual in that it preys entirely on fish, the discussion of effects of PAHs on prey is limited to fish.

Overview

PAHs (Polycyclic Aromatic Hydrocarbons) are a group of chemicals formed from the incomplete burning of coal, oil and gas, wood, garbage, or other organic substances (ATSDR, 2006). They also are found in petroleum and petroleum-based products (plastics, creosote, roofing tar, asphalt, etc.). The petrogenic PAHs (geochemical alteration of organic matter from petroleum spills, coal fired plants, etc.) are more available biologically to aquatic life than the pyrogenic (incomplete combustion of organic matter) PAHs (Thorsen et al. 2004). True PAHs have two to seven benzene rings composed solely of carbon and hydrogen with alternating single and double bonds between the carbons in the ring structure. There are more than 100 different PAHs, which generally occur in the environment as complex mixtures. PAHs are found throughout the abiotic and biotic environment in the air, water, and soil. PAHs are a less widely recognized marine contaminant (Marine Mammal Commission 1999), and they are usually assessed as a mixture of substances included with chlorinated pesticides (DDT and its derivatives), polychlorinated biphenyls (PCB), dioxins, furans, and metals, which are considered hazardous to animals. Because PAHs are metabolized by animals (Niimi, A.J. and V. Palazzo 1986), their contribution to marine contamination is typically confounded and overshadowed by other more prevalent, persistent, and toxic chemicals.

PAHs enter the environment mostly as releases to air from volcanoes, forest fires, residential wood burning, and exhaust from automobiles and trucks. They also enter surface water through discharges from municipal combined sewer outfalls, industrial plants and waste water treatment plants, spills of chemical or petroleum. Because of

these sources and their affinity for particles, some PAH compounds occur in elevated concentrations in sediments and hazardous waste sites. PAHs in general possess low solubilities in water. They are present in air as vapors or attached to the surface of small solid particles, which can be transported to the marine environment by stormwater runoff. They can come from geographically distant locations by traveling long distances before returning to earth in rainfall or particle settling. Some PAHs evaporate into the atmosphere from surface water, but most stick to solid particles and settle to the bottoms of marine environments and the adjacent rivers and lakes. Some PAHs evaporate from surface soils to air. Consequently, there are many sources of PAHs making it impossible to define the relative contribution of each source to the overall PAH levels in most regions including Washington state marine waters (Barrick and Prahl 1987).

Mammals, fish, and many invertebrates (crustaceans, polychaetes, echinoderms, insects) have well-developed mixed-function oxidase (MFO) systems, which enable them to efficiently metabolize and excrete some of the hydrocarbons ingested during feeding, grooming, and respiration (Lee 1977; Engelhardt 1983; James 1989; Rattner et al. 1989; Jenssen et al. 1990; Eisler 2000). As with microbes, large aromatic hydrocarbons (e.g. petroleum) are the most difficult group of hydrocarbons to excrete, regardless of MFO capability (Varanasi et al. 1989; Eisler 2000). Accumulation of PAHs is mostly associated with body lipid content, food habits and distributions that coincide with areas with elevated PAH concentration (e.g. superfund sites) of (McElroy et al. 1989; Eisler 2000). Trophic level increases in accumulation (i.e., biomagnification) have not been observed in aquatic ecosystems (McElroy et al. 1989; Broman et al. 1990), since it is more common for an animal to metabolize rather than accumulate and transfer PAHs up the food chain. This is not the case for chlorinated pesticides (DDT, etc.) and chlorinated hydrocarbons (such as PCBs) (Schmidt and Johnson, 2001). Consequently, PAHs are not available to top predators such as killer whales, and they are largely confined to animals feeding or living in contaminated sediment.

The mechanism of toxicity for PAHs seems to be interference with cellular membrane function and enzyme system associated with the membrane (Neff 1985). Although unmetabolized PAHs can have toxic effects, a bigger concern in animals is the ability of reactive metabolites (epoxides and dihydrodiols) of some PAHs to bind to cellular proteins and DNA causing mutations, developmental malformations, tumors, and cancer (Santodonato et al. 1981; Eisler 2000). While these potentially lethal as well as sublethal effects (from very low concentrations) are associated with chemical or petroleum spills and hazardous waste sites, environmental concentrations of PAHs in water are usually several orders of magnitude below levels that are acutely toxic to aquatic organisms (Albers and Loughlin 2003). Sediment PAH concentrations can be much higher than water concentrations, but the limited bioavailability of these PAHs greatly reduces their toxic potential (Eisler 2000).

Killer Whales

Limited information is available on the effects of PAHs on killer whales and their prey in Washington state waters as well as elsewhere in their range. Similarly, information on the effects of specific fractions (PAHs, etc.) of petroleum on killer whales and other marine mammals is very limited and much more focused on the physical and toxic effects of whole crude or refined petroleum on marine mammals. Petroleum is a source of the two-six benzene ring PAHs that are most resistant to microbial degradation and are most likely to settle into sediments (Colvell and Walker 1977; Neff 1985; James 1989). In the sediments, they may be ingested by lower trophic animals including macroinvertebrates and microorganisms (Albers and Loughlin 2003). However, the effects of PAHs are primarily limited to aquatic life that feed at the surface of the sediments or within the sediments, and they do not have the propensity to transfer up the food chain to killer whales.

The southern resident killer whale population has a high level of chemical contamination but the detectable chemicals have not been reported to include PAHs (Schmidt and Johnson 2001). Research by the British Columbia Department of Fisheries and Oceans found PCBs and DDTs at extremely high levels, lower levels of dioxins and furans, and higher levels of PCB and DDT in males than females, suggesting females excrete over 60% of their chemical residues through nursing (Ross et al. 2000). They did not report finding PAHs (Schmidt and Johnson 2001).

Prey

The southern resident killer whale population feeds exclusively on fish, primarily salmon. Salmon comprise 96% of the prey during late spring through and fall, when the resident killer whales inhabit Washington inland waters (Ford and Ellis 2005). Chinook salmon are selected over other species, comprising over 70% of the salmon taken by them (Ford and Ellis 2005). Other salmonids eaten in smaller amounts included chum (22%), pink (3%), coho (2%), sockeye (1%), and steelhead (<1%). Small proportions of a wide variety of bottom fish (rockfish, ling cod, halibut, sole, etc.), herring, and squid have been reported during predation events of resident killer whales (Ford and Ellis, 2005). Consequently, fish species (bottom fish) with the highest potential to be contaminated by PAHs contribute very little to the diet of resident killer whales.

PAHs have been implicated in effecting the health of some salmon, herring, and some bottom fish (English sole) from sediments in highly contaminated areas of Puget Sound (Puget Sound Water Quality Action Team, 1998) and Prince William Sound (WWW.AFSC.noaa.gov/ABL/OilSpill/pstoxici.htm). Elevated mortalities of pink salmon embryos were found in contaminated sections of streams in Prince William Sound affected by the Exxon Valdez oil spill. Embryos exposed to aqueous PAH concentrations showed an increase in mortality and reduced growth compared to unexposed fish. Juvenile salmon from the contaminated Duwamish River estuary; English sole from contaminated Hylebos waterway in Commencement Bay, Dyes Inlet, Elliott Bay, and Duwamish River; rockfish in Elliott Bay, and herring in Fidalgo Bay

were found to have PAH metabolites as well as PCBs, DDT (and its derivatives), as well as other toxic compounds and metals (Schmidt and Johnson 2001, Redman et al. 2006). Concentrations of PAH metabolites were highest in bottom fish, followed by herring in these urban areas, but were low for all species in non-urban areas (Schmidt and Johnson 2001). Major sources of PAHs in Elliott Bay were combined sewer overflows and possibly stormwater (King County DNR 1998). PAH inputs from the latter have declined in recent years, but the status of stormwater contributions is unknown (King County DNR 1998). While resident killer whales eat a wide variety of fish, fish species (bottom fish) with the highest potential to be affected by PAHs contribute very little to their diet, and the resident population is not known to regularly feed in the toxic urban areas of Puget Sound.

Conclusions

The following conclusions can be made about the effects of PAHs on the southern resident killer whale population and its prey:

- There is no evidence that PAHs adversely effect the southern resident killer whale population, since trophic level increases (biomagnification) of PAHs have not been observed in aquatic systems.
- The greatest concentrations of PAHs are in highly contaminated areas not regularly visited by resident killer whales in Puget Sound.
- The potential for PAHs to affect the prey of the resident killer whale population is likely quite small, since species most vulnerable to PAH contamination represent a very small proportion of their diet.
- The migratory nature and mid- to surface-water feeding habits of salmon greatly reduce their exposure to PAHs compared to most bottom fish that spend their entire life in a relatively small area feeding in the sediment. Salmonids also go to sea; hence they are less exposed to residues of PAHs from local sources than in-Sound resident species.
- The contribution of some industry point sources, such as petroleum refineries, in Puget Sound to PAHs in the marine environment is small compared to the large number of sources and pathways in the region.¹
- To the extent that there may be an effect on some southern resident killer whale prey and subsequently killer whales, it is overshadowed by the prevalence of more toxic, persistent, and biologically available chemicals, including PCBs, DDTs and its derivatives, dioxin, and a variety of metals or organometals like tributyltin.

¹ See, e.g., Letter from G.E. Goodman (ConocoPhillips) to Department of Ecology, Attn: Office of Comprehensive Programming (dated Jan. 12, 2006) (forwarding 2004-2005 human health criteria monitoring results prepared by Whatcom Environmental Services).

Literature Cited

Albers P.H. and T. R. Loughlin. 2003, Effects of PAHs on marine birds, mammals, and reptiles. PAHs: an ecotoxicological perspective. Edited by P.E.T. Douben. JohnWiley & Sons Ltd.

Agency for Toxic Substances and Disease Registry (ATSDR). 2006. Public health statement for polycyclic aromatic hydrocarbons (PAHs).
www.atsdr.cdc.gov/toxprofiles/phs69.html.

Barrick, R.C. and F.G. Prahl. 1987. Hydrocarbon Geochemistry of the Puget Sound Region: III. Polycyclic Aromatic Hydrocarbons in Sediments. Est. Coastal "Shelf Sci. 25(2):175-191.

Broman D., D. Naf, I. Lundbergh, and Y. Zebuhr. 1990. An in situ study on the distribution, biotransformation and flux of polycyclic aromatic hydrocarbons (PAHs) in the aquatic food chain from the Baltic: an ecotoxicological perspective. Environmental Toxicology and Chemistry. 9:429-442.

Colwell, R.R. and J.D. Walker. 1977. Ecological aspects of microbial degradation of petroleum in the marine environment. Critical Reviews in Microbiology. 5:423-445.

Eisler, R. 2000. Handbook of chemical risk assessment. Vol. 2. Lweis, Boca Raton, FL. Pp. 1343-1411.

Engelhardt, R.R. 1983. Petroleum effects on marine mammals. Aquatic Toxicology. 4:199-217.

Ford, J.K.B, and G.M. Ellis. 2005. Prey selection and food sharing by fish-eating resident killer whales in British Columbia. Fisheries and Oceans Science Advisory Secretariat. 2005/041.

James, M.O. 1989. Microbial degradation of PAS in the aquatic environment. In Varanasi U. (ed.), Metabolism of Polycyclic Aromatic Hydrocarbons in the Aquatic Environment. CRC Press, Boca Raton, FL., pp.69-91.

Jenssen, B.M. M. Ekker, and K. Zahlse. 1990. Effects of ingested crude oil on thyroid hormones and on the mixed function oxidase system in ducks. Comparative Biochemistry and Physiology. 95C:213-216.

King County. 1998. Combined sewer overflow water quality assessment: assessing water and sediment quality in the Duwamish River and Elliott Bay. Water and Land Resources Division, Department of Natural Resources. Seattle, Washington

Lee, R.F. 1977. Fate of oil at sea. In Four PL (ed.) Proceeding of the 1977 Oil Spill Response Workshop. FWS/OSB/77-24. United States Fish and Wildlife Service, Washington, D.C. pp43-54.

Loughlin, T.R. (ed.) 1944. Marine Mammals and the Exxon Valdez. Academic Press, New York. 395 pp.

Marine Mammal Commission. 1999. Marine mammals and persistent ocean contaminants: proceedings of the Marine Mammal Commission workshop, Keystone, Colorado, 12-15 October 1998, Bethesda, MD, pp 6-16, 87-92.

McElroy, A.E., J.W. Farrington, and J.M. Teal. 1989. Bioavailability of polycyclic aromatic hydrocarbons in the aquatic environment. In Varanasi U (ed.), Metabolism of Polycyclic Aromatic Hydrocarbons in the Aquatic Environment. CRC Press, Boca Raton, FL., pp 1-39.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. I Rand G.M. and S.R. Petrocilli (eds.), Fundamental of Aquatic Toxicology. Hemisphere, New York, pp. 416-454.

Niimi A.J., and V. Palazzo. 1986. Biological half-lives of eight polycyclic aromatic hydrocarbons (PAHs) in rainbow trout (*Salmo gairdneri*). Water Res. 20:503-507.

Rattner, B.A., D.J. Hoffman, and C.N. Marn. Use of mixed-function oxygenases to monitor contaminant exposure. Environmental Toxicology and Chemistry. 8:1093-1102.

Redman, S., A. Criss, J. Dohrmann, and R. Shultz. 2006. Toxics in Puget Sound: a review and analysis to support toxic controls. Puget Sound Action Team. Office of the Governor, State of Washington, Olympia, WA. 28 pp.

Ross, P.S., G.M. Ellis, M.G. Ikononou, L.G. Barrett-Lennard, and R.F. Addison. 2000. High PCB concentrations in free-ranging Pacific killer whales: effects of age, sex, and dietary preferences. Marine Pollution Bulletin. vol. 40, no. 6.

Santodonato, S., P. Howard, and D. Basu. 1981. Health and ecological assessment of polynuclear aromatic hydrocarbons. Journal of Environmental Pathology and Toxicology. 5(Special Issue), 119-122, 191-300.

Schmidt, M. and P. Johnson. 2001. Toxics in the Puget Sound Food Web. People for Puget Sound. 29 pp.

Thorsen, W.A. W.G. Cope, and D. Shea. 2004. Bioavailability of PAHs: Effects of soot carbon and PAH source. Environ. Sci. Tech. 38: 2029-2037.

Varanasi, U., J.E. Stein, and M. Nishimoto. 1980. Biotransformation and disposition of PAH in fish. In Varanasi U (ed.), *Metabolism of Polycyclic Aromatic, Hydrocarbons in the Aquatic Environment*. CRC Press, Boca Raton, FL, pp. 93-149.

Williams, T.M., D.J. O'Connor, and S.W. Nielsen. 1995. The effects of oil on sea otters: histopathology, toxicology, and clinical history. In Williams, T.M. and Davis R.W. (eds.), *Emergency Care and Rehabilitation of Oiled Sea Otters; A Guide for Oil Spills Involving Fur-bearing Marine Mammals*. University of Alaska Press, Fairbanks, AK, pp. 3-22.